

Nuclear and Radioactivity

1. r_1 and r_2 are the radii of atomic nuclei of mass numbers 64 and 27 respectively. The ratio $\frac{r_1}{r_2}$ is
 (a) $\frac{64}{27}$ (b) $\frac{27}{64}$ (c) $\frac{4}{3}$ (d) 1
2. A nucleus ruptures into two nuclear parts which have their velocity ratio equal to 2 : 1. What will be the ratio of their nuclear size (nuclear radius)
 (a) $2^{1/3} : 1$ (b) $1 : 2^{1/3}$ (c) $3^{1/2} : 1$ (d) $1 : 3^{1/2}$
3. Two nuclei are said to be mirror nuclei if
 (a) Number of protons in the two nuclei are equal
 (b) Number of neutrons in the two are equal
 (c) Number of neutrons in one equals number of protons in the other and *vice-versa*
 (d) The number of nucleons in the two are equal
4. The mass number of helium and sulphur are 4 and 32 respectively. The nucleus of sulphur is then how many times greater than the He nucleus
 (a) $\sqrt{8}$ (b) 4 (c) 3 (d) 2
5. What is the radius of iodine atom (Atomic number 53, mass number 126)
 (a) $2.5 \times 10^{-11} m$ (b) $2.5 \times 10^{-9} m$ (c) $7 \times 10^{-9} m$ (d) $7 \times 10^{-6} m$
6. Energy obtained when 1 mg mass is completely converted to energy is
 (a) $3 \times 10^8 J$ (b) $3 \times 10^{10} J$ (c) $9 \times 10^{13} J$ (d) $9 \times 10^{15} J$
7. The energy liberated on complete fission of 1 kg of ${}_{92}U^{235}$ is (Assume 200 MeV energy is liberated on fission of 1 nucleus)
 (a) $8.2 \times 10^{10} J$ (b) $8.2 \times 10^9 J$ (c) $8.2 \times 10^{13} J$ (d) $8.2 \times 10^{16} J$
8. The mass defect in a particular nuclear reaction is 0.3 gm. The amount of energy liberated in kilowatt hours is (Velocity of light = $3 \times 10^8 m/s$)
 (a) 1.5×10^6 (b) 2.5×10^6 (c) 3×10^6 (d) 7.5×10^6
9. What was the fissionable material used in bomb dropped at Nagasaki (Japan) in the year 1945
 (a) Uranium (b) Nepturium (c) Berkalium (d) Plutonium
10. The atomic number and the mass number of an atom remains unchanged when it emits
 (a) A photon (b) A neutron (c) β -particle (d) An α -particle
11. Light energy emitted by stars is due to
 (a) Breaking of nuclei (b) Joining of nuclei (c) Burning of nuclei (d) Reflection of solar light
12. Which of the following rays are not electromagnetic waves
 (a) γ -rays (b) β -rays (c) Heat rays (d) X-rays
13. A nucleus with $Z = 92$ emits the following in a sequence :
 $\alpha, \beta^-, \beta^-, \alpha, \alpha, \alpha, \alpha, \alpha, \beta^-, \beta^-, \alpha, \beta^+, \beta^+, \alpha$. The Z of the resulting nucleus is
 (a) 74 (b) 76 (c) 78 (d) 82
14. Radioactive nuclei that are injected into a patient collect at certain sites within its body, undergoing radioactive decay and emitting electromagnetic radiation. These radiations can then be recorded by a detector. This procedure provides an important diagnostic tool called
 (a) Gamma camera (b) CAT scan (c) Radiotracer technique (d) Gamma ray spectroscopy
15. The mass of radon-222 corresponding to 1 Curie will be, if its half life is 3.8 days
 (a) $6.46 \times 10^{-8} gm$ (b) $64.60 \times 10^{-7} gm$ (c) $6.46 \times 10^{-10} gm$ (d) $64.60 \times 10^{-10} gm$